

REMARKS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 6-10, 14, 15, 19, 23, 26, 27, 29 and 30 are currently pending in this application. By this Amendment, the applicants amend Claims 6, 8, 9, 15, 23, 27 and 30; and leave Claims 7, 10, 14, 19, 26 and 29 unamended. Thus, all 13 claims remain in this application reconsideration.

In the outstanding Office Action, the disclosure was found objectionable because the specification uses dimensions for the dimensionless variable of specific gravity on page 23; Claims 6-10, 14, 15, 19, 23, 26, 27, 29 and 30 were rejected under 35 U.S.C. §112, first paragraph, for adding new matter; Claims 6-10, 14, 15, 19, 23, 26, 27, 29 and 30 were rejected under 35 U.S.C. §112, second paragraph, for indefiniteness; Claims 6, 7, 10, 14, 15, 19, 26, 29 and 30 were rejected under 35 U.S.C. §103(a) for obviousness over the U.S. Patent of Gentry in view of either the U.S. Patent of Beck et al. or the U.S. Patent of Takagi et al.; Claims 8 and 9 were rejected under 35 U.S.C. §103(a) for obviousness over Gentry in view of either Beck et al. or Takagi et al., taken further in view of published European Patent Application No. 636,399; and Claims 23 and 27 were rejected under 35 U.S.C. §103(a) for obviousness over International Patent Publication No. WO 96/13463 in view of Gentry, as modified by either Beck et al. or Takagi et al.

Regarding the objection to the disclosure, page 23 of the specification has been amended at lines 10-25 to remove the dimensions stated for the dimensionless variable of specific gravity. Also, other grammatical corrections have been made to this paragraph. Therefore, withdrawal of the objection to the disclosure is respectfully requested.

Regarding the rejection of Claims 6-10, 14, 15, 19, 23, 26, 27, 29 and 30 under 35 U.S.C. §112, first paragraph, for alleged new matter, the phrase “substance excluding alumina” has been deleted from independent Claims 6, 15, 23, 27 and 30. Therefore, withdrawal of the rejection of Claims 6-10, 14, 15, 19, 23, 26, 27, 29 and 30 under 35 U.S.C. §112, first paragraph, for new matter, is respectfully requested.

Regarding the rejection of Claims 6-10, 14, 15, 19, 23, 26, 27, 29 and 30 under 35 U.S.C. §112, second paragraph, for indefiniteness, the alleged indefinite language contained in Claims 6, 8, 9, 15, 23, 27 and 30 has been removed. Therefore, withdrawal of the rejection of Claims 6-10, 14, 15, 19, 23, 26, 27, 29 and 30 under 35 U.S.C. §112, second paragraph, for indefiniteness is respectfully requested.

Independent Claim 6, as amended, is directed to an apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while treating waste water. The apparatus comprises a packed bed of the solid catalyst and/or the solid adsorbent and a water-permeable pressure layer having a load which can suppress a deformation of the packed bed of the solid catalyst and/or the solid adsorbent. The water-permeable pressure layer is provided on the packed bed of the solid catalyst and/or the solid adsorbent. This water-permeable pressure layer is a substance having a plurality of rigid metal particles or ceramic particles. If rigid metal particles are used, they are one of stainless steel, titanium and zirconium.

Independent Claim 6, as well as independent Claims 15, 23, 27 and 30, now recite that the rigid metal particles are one of stainless steel, titanium and zirconium. Support for this recitation is found in the original specification at page 24, lines 11-21.

Turning now to the various rejections of the independent claims for obviousness over Gentry in view of either Beck et al. or Takagi et al., the applicants respectfully submit that the

limitations of exemplary Claim 6, as amended, are not rendered obvious by Gentry in view of Beck et al. or Takagi et al., when considered in proper combination.

The prior art device of Gentry and the present invention are different in terms of the kinds of metallic particles constituting the water-permeable pressure layer and/or the dispersing and mitigating layer. The particles for the above layer in the present invention have a higher specific gravity than the alumina balls which are used by Gentry.

The water-permeable pressure layer in the present invention is specifically designed to have a load sufficient to suppress substantially a movement of the solid catalyst while securing flexibility to follow up the movement of the solid catalyst packed bed, as well as having water-permeability.

The dispersing and migrating layer in the present invention is specifically designed to satisfy the desired effect required with respect to high abrasion resistance, corrosion resistance, and strength. For these three purposes, the specific metallic particles are either stainless steel, titanium or zirconium, which are used as the granular substance constituting the water-permeable pressure layer and/or the dispersing and mitigating layer. See the specification at page 24, lines 14-21. Also, see the specification beginning on page 39 at line 23 through page 40 at line 2.

Gentry discloses a liquid-phase catalyst assembly for a chemical process tower in which alumina balls are used. However, these alumina balls have the following disadvantages.

First, the alumina balls have such a small specific gravity that they fail to exert a load onto the water-permeable pressure layer, which load is sufficient to suppress movement of the solid catalyst packed bed. Thus, the alumina balls fail to provide the desired effect obtained by the water-permeable pressure layer of the present invention.

Secondly, if the water-permeable pressure layer and/or the dispersing and mitigating layer use alumina balls in a wet-oxidation treatment unit, the alumina therein may be oxidized to

dissolve in the case of treating waste water having a low pH or in the case of treating waste water for a long period of time.

Because of these disadvantages, the preferable substance used in the wet-oxidation treatment unit of the present invention is a substance constituted by either stainless steel, titanium or zirconium and not alumina.

Thus, Gentry fails to teach or suggest that an apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while treating waste water may include a water-permeable pressure layer composed of a substance having a plurality of rigid metal particles that are one of stainless steel, titanium and zirconium.

With regard to the secondary references of Beck et al. and Takagi et al., they fail to supply this deficiency existing in the primary prior art reference of Gentry. Thus, these differences between the present invention and the prior art devices make it unobvious to change the basic reference of Gentry to incorporate any elements from the secondary references that would render the present invention obvious. Therefore, the present invention as a whole is patentably distinguishable from the combination of cited prior art references.

Based upon the above discussion, it is respectfully submitted that the independent claims are patentably distinguishable over the applied references. Therefore, the dependent claims are likewise patentably distinguishable thereover.

In conclusion, the applicants believe that it would not be obvious for a person skilled in the art to devise the present invention by combining the teachings of Gentry with either the teachings of Beck et al. or Takagi et al.

Consequently, in view of the foregoing amendments and remarks, no further issues are believed to be outstanding and the present application should be considered in condition for formal allowance. Therefore, a quick and favorable action is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Registration No. 25,599
Attorney of Record
Joseph Scafetta, Jr.
Registration No. 26,803



22850

(703) 413-3000
Fax (703) 413-2220
GJM:JAS:eac

Marked-Up Copy

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IN THE SPECIFICATION

Page 23, lines 10-25, please delete the paragraph and replace it with the following paragraph:

The specific gravity of the granular substance is not specifically limited, and may be properly determined. In general, however, the specific gravity thereof is $2.5[\text{g}/\text{cm}^3]$ or larger, and preferably in the range between 4 to $12[\text{g}/\text{cm}^3]$. If the specific gravity is too small, sufficient pressure cannot be given to the solid catalyst packed bed. In this case, in order to give sufficient pressure to the solid catalyst, it is necessary to increase the [use] amount of the granular substance, which [creases] ~~creates~~ a problem of high cost and the like. In addition, [too] a small specific gravity has another problem in that, when waste water and [the] air are introduced at a high flow rate from the bottom of the solid catalyst packed bed, the granular substance tends to [easily] move ~~easily~~ and is abraded. In this description, the specific gravity means true specific gravity, and is not bulk density, fill density, and apparent specific gravity which are generally used.

IN THE CLAIMS

Amended Claims 6, 8, 9, 15, 23, 27 and 30 are shown below.

6. (Five Times Amended.) An apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while treating waste water, comprising:

a packed bed of the solid catalyst and/or the solid adsorbent; and

a water-permeable pressure layer having a load which can suppress a deformation of the packed bed of the solid catalyst and/or the solid adsorbent;

wherein the water-permeable pressure layer is provided on the packed bed of the solid catalyst and/or the solid adsorbent;

wherein the water-permeable pressure layer is a substance having a plurality of rigid metal particles or ceramic particles; and

wherein the [substance excluding alumina has a specific gravity ranging from 4.0 to 12] rigid metal particles are one of stainless steel, titanium and zirconium.

8. (Four Times Amended.) The apparatus according to claim 6, wherein the respective segments formed by [the] a vertical partition have a cross-sectional area of 50 to 5000 cm².

9. (Four Times Amended) The apparatus according to claim 6, wherein [the] a vertical partition has a height of 20 to 300 cm in [the] a vertical direction.

15. (Four Times Amended.) An apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while treating waste water, comprising:

a packed bed of the solid catalyst and/or the solid adsorbent; and

a layer configured to disperse and mitigate an upward stream of the waste water and/or a waste gas;

wherein the dispersing and mitigating layer is provided under the packed bed of the solid catalyst and/or the solid adsorbent;

wherein the dispersing and mitigating layer is a substance having a plurality of rigid metallic particles or ceramic particles; and

wherein the [substance excluding alumina has a specific gravity ranging from 4.0 to 12]
rigid metallic particles are one of stainless steel, titanium and zirconium.

23. (Thrice Amended.) An apparatus for [prevent] preventing abrasion of a solid catalyst and/or a solid adsorbent while treating waste water, comprising:

a packed bed of the solid catalyst and/or the solid adsorbent; and

a water-permeable pressure layer having a load which can suppress a deformation of the packed bed of the solid catalyst and/or the solid adsorbent;

wherein the water-permeable pressure layer is provided on the packed bed of the solid catalyst and/or the solid adsorbent;

wherein the water-permeable pressure layer is a substance having a plurality of rigid metal particles or ceramic particles;

wherein the [substance excluding alumina has a specific gravity ranging from 4.0 to 12]
rigid metal particles are one of stainless steel, titanium and zirconium; and

wherein the packed bed is provided in a wet-oxidation treatment unit.

27. (Twice Amended.) An apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while treating waste water, comprising:

a packed bed of the solid catalyst and/or the solid adsorbent; and

a layer configured to disperse and mitigate an upward stream of the waste water and/or a waste gas;

wherein the dispersing and mitigating layer is provided under the packed bed of the solid catalyst and/or the solid adsorbent;

wherein the dispersing and mitigating layer is a substance having a plurality of rigid metallic particles or ceramic particles;

wherein the [substance excluding alumina has a specific gravity ranging from 4.0 to 12] rigid metallic particles are one of stainless steel, titanium and zirconium; and

wherein the packed bed is provided in a wet-oxidation treatment unit.

30. (Twice Amended.) An apparatus for preventing abrasion of a solid catalyst and/or a solid adsorbent while treating waste water comprising:

a packed bed of the solid catalyst and/or the solid adsorbent;

a water-permeable pressure layer having a load which can suppress a deformation of the packed bed of the solid catalyst and/or the solid adsorbent; and

a layer configured to disperse and mitigate an upward stream of the waste water or a waste gas, said layer being provided under the packed bed;

wherein the pressure layer is provided on the packed bed of the solid catalyst and/or the solid adsorbent;

wherein the dispersing and mitigating layer is a plurality of rigid metallic particles or ceramic particles; and

wherein the [substance excluding alumina has a specific gravity ranging from 4.0 to 12] rigid metallic particles are one of stainless steel, titanium and zirconium.